

Transitions
(Transitions to College Mathematics)
Preliminary List of Topics & Learning Outcomes

Equations, Inequalities and Systems

- ✦ Communicate accurately special cases of equations and systems of equations (involving contradictions and identities)
- ✦ Solve 2 variable systems of equations or inequalities
- ✦ Apply basic properties of equations to solve simple systems of equations in 2 or 3 variables.
- ✦ Solve inequalities (linear, quadratic, absolute value.)
- ✦ Apply basic properties of equations to solve linear, quadratic, exponential, radical, rational) equations. [Possibly include logarithmic.]

Functions and Properties of Functions

- ✦ Use linear, exponential and logarithmic functions given in symbolic form
- ✦ Given a function and domain, create a reasonable coordinate system showing the domain and range
- ✦ Identify the appropriate domain for any basic function
- ✦ Distinguish between discrete and continuous functions, and recognize when each is appropriate
- ✦ Use the 3 basic functions of right triangle trigonometry
- ✦ Graph the sine and cosine functions, and identify their periodic nature
- ✦ Graph linear, exponential, and other (some of radical, rational, logarithmic, and/or polynomial) functions
- ✦ Recognize the difference between discrete and continuous functions, and when each type is more appropriate.
- ✦ Interpret formulae that can be used to compute payments and know how to use technology such as spreadsheets to create amortization schedules.
- ✦ Describe the nonlinear nature of compounded interest rates such as the future value of money.
- ✦ Understand the concept of functions and rates of change, and illustrate that understanding effectively using multiple representations (symbolic, numeric, graphic, and verbal)
- ✦ Use Mathematics of finance (such as future value and monthly payment)
- ✦ Describe power and logistic growth

Graphing

- ✦ Calculate the rate of change at a point, and identify this as either the slope of the curve or the slope of the tangent line
- ✦ Graph (precisely with technology and to sketch without technology) all elementary functions (linear and nonlinear)
- ✦ Identify the basic nature of a graph (given the graph, classify it as linear, exponential, radical, rational, or polynomial)
- ✦ Using technology, find the slope at a point for an exponential or polynomial function and interpret the meaning of this slope
- ✦ Graph $y = 1/x$ and verify points on the curve.

Geometry and Trigonometry

- ✦ Recognize basic two- and three-dimensional shapes involving rectangular, triangular, spherical and conical components.
- ✦ Use of degree-minutes-seconds notation for measures of angles

Modeling

- ✦ Model data with linear, exponential and logarithmic functions and use those models to make predictions and decisions
- ✦ Model problems with multiple conditions using linear equations or inequalities with up to 3 variables
- ✦ Recognize various growth and decay models such as linear, exponential, power and logistic.
- ✦ Represent data in matrix form, including the use of a spreadsheet; and produce a reasonable graph
- ✦ Design an experiment that collects appropriate data in order to find a reasonable model and then use that model to make predictions and/or observations.
- ✦ Explain a mathematical argument in words, organize mathematical data into tables, organize mathematical data into graphs, and understand the meaning of simple mathematical formulas and equations.
- ✦ Judge the validity of logical arguments.
- ✦ fit an appropriate curve to a scatterplot and use the resulting function for prediction and analysis
- ✦ Observe and describe trends in numerical data
- ✦ Recognize that matrices (arrays) can be used to manipulate data as well as store data.
- ✦ Detect whether data has a power pattern. Use these patterns to analyze trends and predict trends.

Properties of Numbers and Polynomial Arithmetic

- ✦ Perform procedures (such as simplifying exponential expressions and factoring polynomials), and communicate these processes clearly
- ✦ Apply basic properties of real numbers to simplify, evaluate, and expand expressions
- ✦ Apply appropriate replacement sets for variables, and use the concept of parameter (such as a, b, c in $ax^2 + bx + c$)
- ✦ Recognize when rounded numbers are being used in contexts, such as reports in the media.
- ✦ Apply concepts used with data, such as 'precision', 'significant digits', 'significance' and 'error'.
- ✦ Interpret the significance of calculator results, and how to communicate these results within the precision of the problem.

Sets and Counting

- ✦ Create, or interpret a Venn diagram.
- ✦ Perform basis operations on sets (union, intersection), and use basic set notation
- ✦ Use counting methods on small finite sets, including operations on those sets

Statistics

- ✦ Calculate probabilities involving selections from sets (with and without replacement, conditional)
- ✦ State reasons why statistical arguments can be faulty including common sources of error
- ✦ Describe how probability and expected value can be used to evaluate policies and to make decisions about what policies to make.
- ✦ Apply percentile rank.
- ✦ Use Descriptive statistics, conditional probability and regression analysis

Credits:

This preliminary list of learning outcomes is extracted from three lists at dm-new-life.wikispaces.com, being the outcomes that remain when those selected for "Course 1" ("FML") are eliminated. This list of outcomes has not been reviewed and edited by the New Life Project.